Chapter 3 OPERATION USING THE KEYPAD

3.1 LED Monitor, Keys and LED Indicators on the Keypad

As shown at the right, the keypad consists of a four-digit LED monitor, six keys, and five LED indicators.

The keypad allows you to run and stop the motor, monitor running status, and switch to the menu mode. In the menu mode, you can set the function code data, monitor I/O signal states, maintenance information, and alarm information.

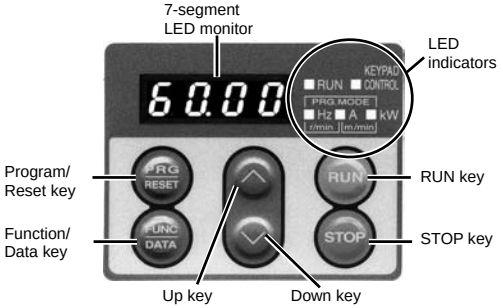


Table 3.1 Overview of Keypad Functions

Item	LED Monitor, Keys, and LED Indicators	Functions
LED Monitor	60.00	Four-digit, 7-segment LED monitor which displays the following according to the operation modes. ■ In Running mode: Running status information (e.g., output frequency, current, and voltage) ■ In Programming mode: Menus, function codes and their data ■ In Alarm mode: Alarm code, which identifies the error factor if the protective function is activated.
Operation Keys	PRG RESET	Program/Reset key which switches the operation modes of the inverter. ■ In Running mode: Pressing this key switches the inverter to Programming mode. ■ In Programming mode: Pressing this key switches the inverter to Running mode. ■ In Alarm mode: Pressing this key after removing the error factor will switch the inverter to Running mode.
	FUNC DATA	Function/Data key which switches the operation you want to do in each mode as follows: ■ In Running mode: Pressing this key switches the information to be displayed concerning the status of the inverter (output frequency (Hz), output current (A), output voltage (V), etc.). ■ In Programming mode: Pressing this key displays the function code and sets the data entered with the ▲ / ▼ key. ■ In Alarm mode: Pressing this key displays the details of the problem indicated by the alarm code that has come up on the LED monitor.
	RUN	RUN key. Press this key to run the motor.
	STOP	STOP key. Press this key to stop the motor.
	▲ / ▼	UP and DOWN keys. Press these keys to select the setting items and change the function code data displayed on the LED monitor.
LED Indicators	RUN LED	Lights when any run command to the inverter is active.
	KEYPAD CONTROL LED	Lights when the inverter is ready to run with a run command entered by the RUN key. In Programming and Alarm modes, you cannot run the inverter even if the indicator lights.
	Unit and mode expression by the three LED indicators	The lower 3 LED indicators identify the unit of numeral displayed on the LED monitor in Running mode by combination of lit and unlit states of them. Unit: kW, A, Hz, r/min and m/min Refer to Chapter 3, Section 3.3.1 "Monitoring the running status" for details.
		While the inverter is in Programming mode, the LEDs at both ends of the lower indicators light. In Programming mode: ■Hz □A ■kW

Simultaneous keying

Simultaneous keying means pressing two keys at the same time. The FRENIC-Eco supports simultaneous keying as listed below. The simultaneous keying operation is expressed by a "+" letter between the keys throughout this manual.

(For example, the expression "STOP + ∧ keys" stands for pressing the ∧ key while holding down the STOP key.)

Table 3.2 Simultaneous Keying

Operation mode	Simultaneous keying	Used to:
Programming mode	STOP + ∧ keys	Change certain function code data. (Refer to codes F00, H03, and H97 in Chapter 5 "FUNCTION CODES.")
	STOP + ∨ keys	
Alarm mode	STOP + PRG/RESET keys	Switch to Programming mode without resetting alarms currently occurred.

3.2 Overview of Operation Modes

FRENIC-Eco features the following three operation modes:

- ■ Running mode : This mode allows you to enter run/stop commands in regular operation. You can also monitor the running status in real time.
- ■ Programming mode : This mode allows you to set function code data and check a variety of information relating to the inverter status and maintenance.
- ■ Alarm mode : If an alarm condition arises, the inverter automatically enters the Alarm mode. In this mode, you can view the corresponding alarm code* and its related information on the LED monitor.

*Alarm code: Indicates the cause of the alarm condition that has triggered a protective function. For details, refer to Chapter 8, Section 8.6 "Protective Functions."

Figure 3.1 shows the status transition of the inverter between these three operation modes.

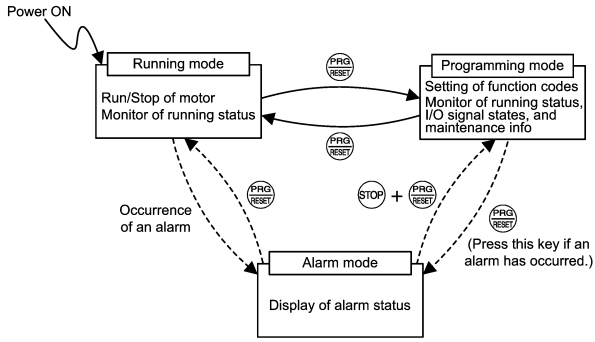
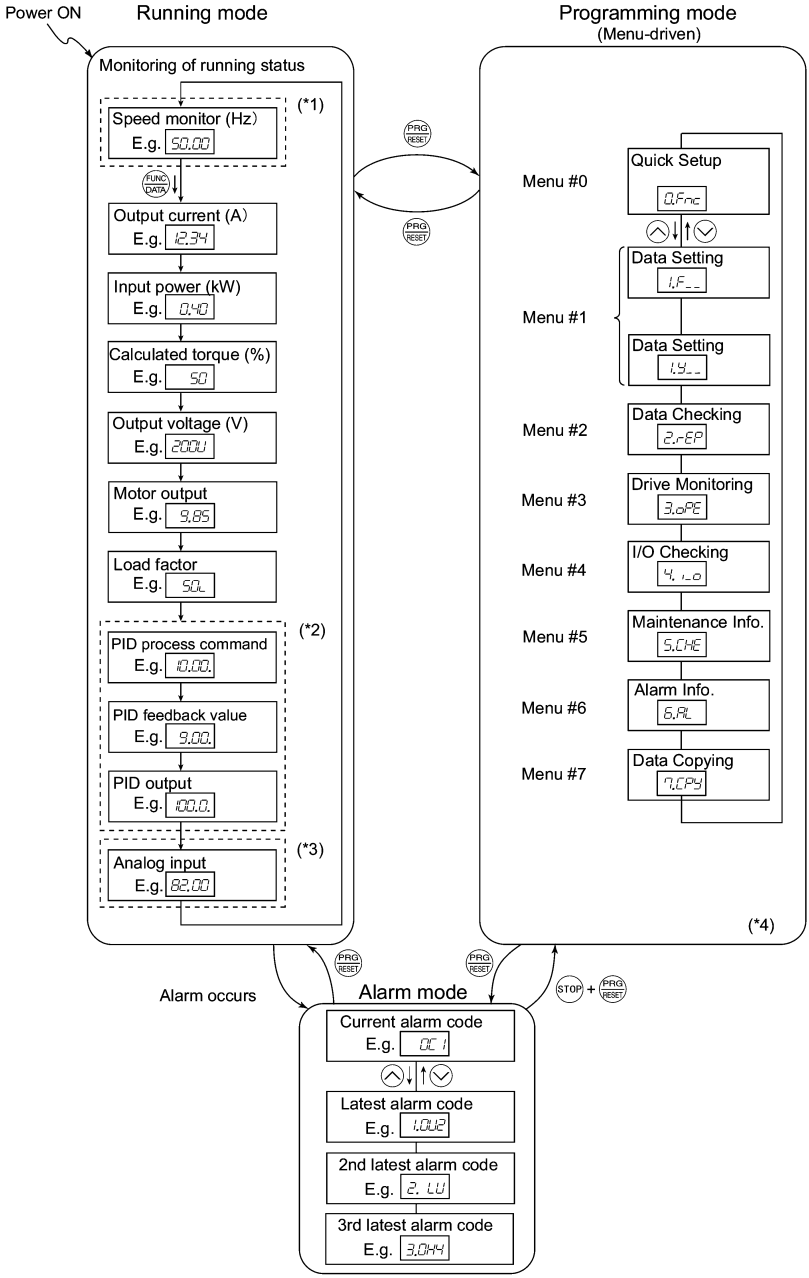


Figure 3.1 Status Transition between Operation Modes

Figure 3.2 illustrates the transition of the LED monitor screen during Running mode, the transition between menu items in Programming mode, and the transition between alarm codes at different occurrences in Alarm mode.



(*1) In speed monitor, you can have any of the following displayed according to the setting of function code E48: Output frequency (Hz), Motor speed (r/min), Load shaft speed (r/min), and Speed (%).

(*2) Applicable only when PID control is active. (J01 = 1 or 2)

(*3) Applicable only when the analog signal input monitor is assigned to any terminals [12], [C1], or [V2] by E61, E62 or E63 (= 20).

(*4) Applicable only when the full-menu mode is active. (E52 = 2)

Figure 3.2 Transition between Basic Display Frames by Operation Mode

3.3 Running Mode

When the inverter is turned on, it automatically enters Running mode. In this mode, you can:

(1) Monitor the running status (e.g., output frequency, output current),

(2) Set up the frequency command and others, and

(3) Run/stop the motor.

3.3.1 Monitoring the running status

In Running mode, the eleven items listed below can be monitored. Immediately after the inverter is turned on, the monitor item specified by function code E43 is displayed. Press the (FUNC/DATA) key to switch between monitor items. For details of switching the monitor item by using the (FUNC/DATA) key, refer to "Monitoring of Running Status" in Figure 3.2 Transition between Basic Display Frames by Operation Mode.

Table 3.3 Monitoring Items

Monitor Items	Display Sample on the LED monitor*1	LED indicator ■: on, □: off	Unit	Meaning of Displayed Value	Function Code E43
Speed monitor	Function code E48 specifies what to be displayed on the LED monitor and LED indicators.				0
Output frequency	50.00	■Hz □A □kW	Hz	Frequency actually being output	(E48 = 0)
Motor speed	1500	■Hz ■A □kW	r/min	Output frequency × 120/P01	(E48 = 3)
Load shaft speed	300.0	■Hz ■A □kW	r/min	Output frequency (Hz) x E50	(E48 = 4)
Speed (%)	50.0	□Hz □A □kW	%	(Output frequency / Maximum frequency) × 100	(E48 = 7)
Output current	12.34	□Hz ■A □kW	A	Current output from the inverter in RMS	3
Output voltage *2	200.0	□Hz □A □kW	V	Voltage output from the inverter in RMS	4
Calculated output torque	50	□Hz □A □kW	%	Motor output torque in % (Calculated value)	8
Input power	10.25	□Hz □A ■kW	kW	Input power to the inverter	9
PID process command *3, *4	10.00.	□Hz □A □kW	—	PID process command/feedback value transformed to that of virtual physical value of the object to be controlled (e.g. Temperature) Refer to the function codes E40 and E41 for details.	10
PID feedback value *3, *5	9.00.	□Hz □A □kW	—		12
PID output *3, *4	100.0.	□Hz □A □kW	%	PID output in % as the maximum frequency (F03) being at 100%	14
Load factor *6	50.L	□Hz □A □kW	%	Load factor of the motor in % as the rated output being at 100%	15
Motor output *7	9.85	□Hz □A ■kW	kW	Motor output in kW	16
Analog input *8	82.00	□Hz □A □kW	—	Analog input signal to the inverter, transformed by E40 and E41 Refer to the function codes E40 and E41 for details.	17

*1 A value exceeding 9999 cannot be displayed on the 4-digit LED monitor screen, so "E 3" (7-segment letters) appear instead.

*2 For displaying an output voltage on the LED monitor, the 7-segment letter "/" is used in the lowest digit as an alternative expression of the unit of the V (volt).

*3 These PID-related items appear only when the inverter PID-controls the motor according to a PID process command specified by the function code J01 (= 1 or 2).

*4 When the LED monitor displays a PID process command or its output amount, the dot (decimal point) attached to the lowest digit of the 7-segment letter blinks.

*5 When the LED monitor displays a PID feedback value, the dot (decimal point) attached to the lowest digit of the 7-segment letter lights.

*6 For displaying a load factor on the LED monitor, the 7-segment letter "L" is used in the lowest digit as an alternative expression of the unit of %.

*7 When the LED monitor displays the motor output, the unit LED indicator "kW" blinks.

*8 Analog input monitoring becomes active only when any data of the function codes E61, E62 and E63 is effective (= 20) to define a terminal function.

3.3.2 Setting up frequency and PID process commands

You can set up the desired frequency and PID process commands by using the ⌃ and ⌄ keys on the keypad. It is also possible to set up the frequency command as load shaft speed, motor speed or speed (%) by setting function code E48.

■ Setting up a frequency command

Using the ⌃ and ⌄ keys (Factory default)

(1) Set function code F01 to "0: Enable ⌃ / ⌄ keys on keypad." This can be done only when the inverter is in Running mode.

(2) Press the ⌃ / ⌄ key to display the current reference frequency. The lowest digit will blink.

(3) If you need to change the frequency command, press the ⌃ / ⌄ key again. The new setting will be automatically saved into the inverter's internal memory and retained even when the power is off. When the power is turned on next time, the setting will be used as an initial reference frequency.

Tip

- The frequency command can be saved either automatically as mentioned above or by pressing the FUNC/DATA key. You can choose either way using function code E64.
- If you have set function code F01 to "0: Enable ⌃ / ⌄ keys on keypad" but have selected a frequency command other than frequency command 1 (i.e., frequency command 2, frequency command via communication, or multistep frequency command), then the ⌃ / ⌄ keys are disabled to change the current frequency command even in Running mode. Pressing either of these keys just displays the current reference frequency.
- When you start specifying or changing the frequency command or any other parameter with the ⌃ / ⌄ key, the lowest digit on the display blinks and starts changing. As you are holding down the key, blinking will gradually move to the upper digit places and the upper digits will be changeable.
- If you press the ⌃ / ⌄ key once and then hold down the PRG/RESET key for more than 1 second after the lowest digit starts blinking, blinking will move to the next upper digit place to allow you to change the value of that digit (cursor movement). This way you can easily change the values of the higher digits.
- By setting function code C30 to "0: Enable ⌃ / ⌄ keys on keypad" and selecting frequency command 2, you can also specify or change the frequency command in the same manner using the ⌃ / ⌄ key.

You can set up a frequency command not only with the frequency (Hz) but also with other menu items (Motor speed, load shaft speed, and speed (%)) depending on the setting of function code E48 (= 3, 4, or 7) "Speed monitor items" as shown in Table 3.3.

■ Make setting under PID control

To enable PID control, you need to set function code J01 to 1 or 2.

Under the PID control, the items that can be set or checked with the ⌃ and ⌄ keys are different from those under regular frequency control, depending upon the current LED monitor setting. If the LED monitor is set to the speed monitor (E43 = 0), you can access manual speed commands (Frequency command) with the ⌃ and ⌄ keys; if it is set to any other, you can access the PID process command with those keys.

📖 Refer to the FRENIC-Eco User's Manual (MEH456), Chapter 4, Section 4.9, "PID Frequency Command Generator" for details on the PID control.

Setting the PID process command with the ⌃ and ⌄ keys

(1) Set function code J02 to "0: Enable ⌃ / ⌄ keys on keypad."

(2) Set the LED monitor to something other than the speed monitor (E43 = 0) when the inverter is in Running mode. When the keypad is in Programming or Alarm mode, you cannot modify the PID process command with the ⌃ / ⌄ key. To enable the PID process command to be modified with the ⌃ / ⌄ key, first switch to Running mode.

(3) Press the ⌃ / ⌄ key to have the PID process command displayed. The lowest digit will blink on the LED monitor.

(4) To change the PID process command, press the ⌃ / ⌄ key again. The PID process command you have specified will be automatically saved into the inverter's internal memory. It is kept there even if you temporarily switch to another means of specifying the PID process command and then go back to the means of specifying the PID process command via the keypad. Also, it is kept there even while the inverter is powered off, and will be used as the initial PID process command next time the inverter is powered on.

Tip

- Even if multistep frequency is selected as the PID process command ((SS4) = ON), you still can set the process command using the keypad.
- When function code J02 is set to any value other than 0, pressing the ⌃ / ⌄ key displays, on the 7-segment LED monitor, the PID command currently selected, while you cannot change the setting.
- On the 7-segment LED monitor, the decimal point of the lowest digit is used to characterize what is displayed. The decimal point of the lowest digit blinks when a PID process command is displayed; the decimal point lights when a PID feedback value is displayed.

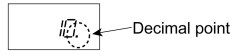


Table 3.4 PID Process Command Manually Set with the ⌃ / ⌄ Key and Requirements

PID Control (Selection) J01	PID Control (Remote Process Command) J02	LED Monitor E43	Multistep Frequency (SS4)	With the ⌃ / ⌄ key
1 or 2	0	Other than 0	ON or OFF	PID process command by keypad
	Other than 0			PID process command currently selected

Setting up the frequency command with the ⌃ and ⌄ keys under PID control

When function code F01 is set to "0: Enable ⌃ / ⌄ keys on keypad" and frequency command 1 is selected as a manual speed command (that is, disabling the frequency setting command via communications link and multistep frequency command), switching the LED monitor to the speed monitor in Running mode enables you to modify the frequency command with the ⌃ / ⌄ keys.

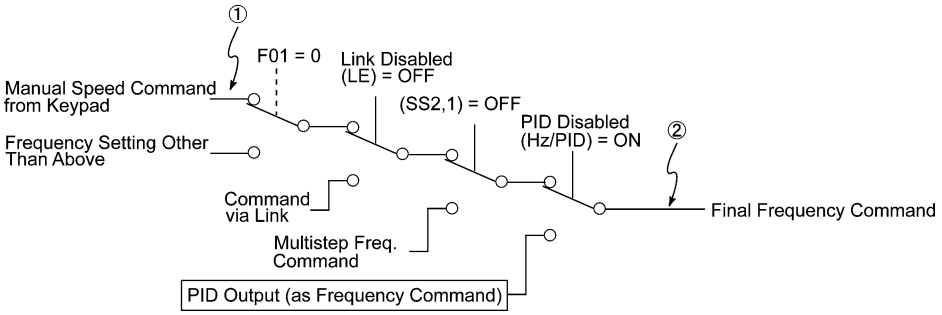
In Programming or Alarm mode, the ⌃ / ⌄ keys are disabled to modify the frequency command. You need to switch to Running mode.

Table 3.5 lists the combinations of the commands and the figure illustrates how the manual speed command ① entered via the keypad is translated to the final frequency command ②.

The setting procedure is the same as that for setting of a usual frequency command.

Table 3.5 Manual Speed (Frequency) Command Set with the ⌃ / ⌄ Keys and Requirements

PID Control (Selection) J01	LED Monitor E43	Frequency Command 1 F01	Multistep Frequency (SS2)	Multistep Frequency (SS1)	Link Operation Selection (LE)	Disable PID Control (Hz/PID)	Pressing the ⌃ / ⌄ keys controls:
1 or 2	0	0	OFF	OFF	OFF	OFF (PID enabled)	PID output (as final frequency command)
						ON (PID disabled)	Manual speed (frequency) command set by keypad
		Other than the above				OFF (PID enabled)	PID output (as final frequency command)
						ON (PID disabled)	Manual speed (frequency) command currently selected



3.3.3 Running/stopping the motor

By factory default, pressing the (RUN) key starts running the motor in the forward direction and pressing the (STOP) key decelerates the motor to stop. The (RUN) key is enabled only in Running mode.

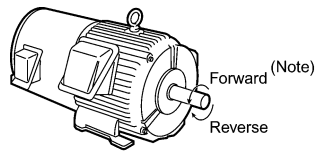
The motor rotational direction can be selected by changing the setting of function code F02.

■ Operational relationship between function code F02 (Run command) and (RUN) key

Table 3.6 lists the relationship between function code F02 settings and the (RUN) key, which determines the motor rotational direction.

Table 3.6 Motor Rotational Direction Specified by F02

Data for F02	Pressing the (RUN) key runs the motor:
0	In the direction commanded by the terminal [FWD] or [REV]
1	(RUN) key disabled (The motor is driven by terminal command [FWD] or [REV].)
2	In the forward direction
3	In the reverse direction



(Note) The rotational direction of IEC-compliant motors is opposite to that of the motor shown here.

For the details on operations with function code F02, refer to Chapter 5 “FUNCTION CODES.”

Note When the keypad is in use for specifying the frequency settings or driving the motor, do not disconnect the keypad from the inverter when the motor is running. Doing so may stop the inverter.

■ Remote and local modes

The inverter can be operated either in remote or local mode. In remote mode that applies to ordinary operation, the inverter is driven under the control of the data settings stored in the inverter, whereas in local mode that applies to maintenance operation, it is separated from the control system and is driven manually under the control of the keypad.

- Remote mode: The run and frequency commands are selected by source switching signals including function codes, run command 2/1 signals,, and communications link operation signal.
- Local mode: The command source is the keypad, regardless of the settings specified by function codes. The keypad takes precedence over the settings specified by run command 2/1 signals or communications link operation signal.

Run commands from the keypad in local mode

The table below shows the input procedures of run commands from the keypad in local mode.

Table 3.7 Run Commands from the Keypad in Local Mode

When Data for F02 (Run command) is :	Input Procedures of Run Commands from Keypad
0: Enable (RUN) / (STOP) keys on keypad (Motor rotational direction from digital terminals [FWD]/[REV])	Pressing the (RUN) key runs the motor in the direction specified by command (FWD) or (REV) assigned to terminal [FWD] or [REV], respectively. Pressing the (STOP) key stops the motor.
1: Enable terminal command (FWD)/(REV)	Pressing the (RUN) key runs the motor in the forward direction only. Pressing the (STOP) key stops the motor. No specification of the motor rotational direction is required.
2: Enable (RUN) / (STOP) keys on keypad (Forward)	
3: Enable (RUN) / (STOP) keys on keypad (Reverse)	Pressing the (RUN) key runs the motor in the reverse direction only. Pressing the (STOP) key stops the motor. No specification of the motor rotational direction is required.

Switching between remote and local modes

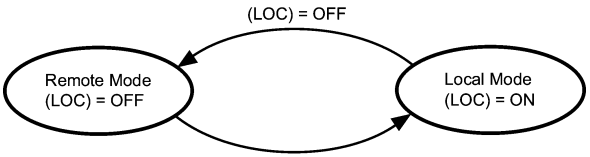
The remote and local modes can be switched by a digital input signal provided from the outside of the inverter.

To enable the switching, you need to assign (LOC) as a digital input signal to any of terminals [X1] to [X5] by setting "35" to any of E01 to E05, E98 and E99. By factory default, (LOC) is assigned to [X5].

Switching from remote to local mode automatically inherits the frequency settings used in remote mode. If the motor is running at the time of the switching from remote to local, the run command is automatically turned on so that all the necessary data settings will be carried over. If, however, there is a discrepancy between the settings used in remote mode and ones made on the keypad (e.g., switching from the reverse rotation in remote mode to the forward rotation only in local mode), the inverter automatically stops.

The transition paths between remote and local modes depend on the current mode and the value (on/off) of (LOC), as shown in the status transition diagram given below. Also, refer to Table 3.7 " Run Commands from the Keypad in Local Mode" for details.

For further details on how to specify run and frequency commands in remote and local modes, refer to the FRENIC-Eco User's Manual (MEH456), Chapter 4, Section 4.3, "Drive Command Generator."



Transition between Remote and Local Modes by (LOC)

3.4 Programming Mode

The Programming mode provides you with these functions--setting and checking function code data, monitoring maintenance information and checking input/output (I/O) signal status. The functions can be easily selected with the menu-driven system. Table 3.8 lists menus available in Programming mode. The leftmost digit (numerals) of each letter string on the LED monitor indicates the corresponding menu number and the remaining three digits indicate the menu contents.

When the inverter enters Programming mode from the second time on, the menu selected last in Programming mode will be displayed.

Table 3.8 Menus Available in Programming Mode

Menu #	Menu	LED monitor shows:	Main functions		Refer to:
0	"Quick Setup"	0Func	Displays only basic function codes to customize the inverter operation.		Section 3.4.1
1	"Data Setting"	1F__	F codes (Fundamental functions)	Selecting each of these function codes enables its data to be displayed/changed.	Section 3.4.2
		1E__	E codes (Extension terminal functions)		
		1C__	C codes (Control functions of frequency)		
		1P__	P codes (Motor parameters)		
		1H__	H codes (High performance functions)		
		1J__	J codes (Application functions)		
		1y__	y codes (Link functions)		
		1o__	o code (Optional function) (Note)		
2	"Data Checking"	2rEP	Displays only function codes that have been changed from their factory defaults. You can refer to or change those function code data.		Section 3.4.3
3	"Drive Monitoring"	3dAt	Displays the running information required for maintenance or test running.		Section 3.4.4
4	"I/O Checking"	4 I_O	Displays external interface information.		Section 3.4.5
5	"Maintenance Information"	5MAIn	Displays maintenance information including cumulative run time.		Section 3.4.6
6	"Alarm Information"	6AL	Displays the latest four alarm codes. You may refer to the running information at the time when the alarm occurred.		Section 3.4.7
7	"Data Copying"	7CPy	Allows you to read or write function code data, as well as verifying it.		Section 3.4.8

(Note) An o code appears only when any option is mounted on the inverter. For details, refer to the instruction manual of the corresponding option.

Figure 3.3 illustrates the menu-driven function code system in Programming mode.

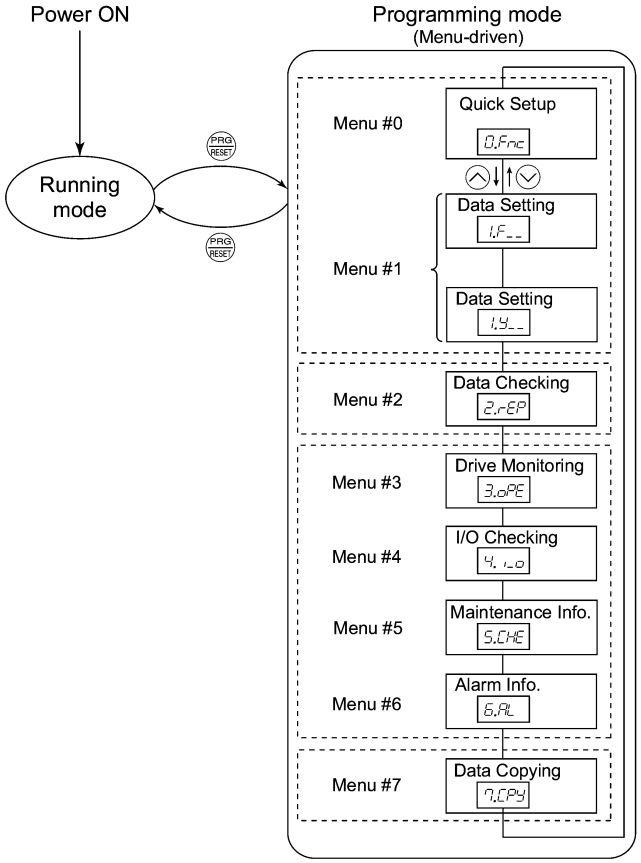


Figure 3.3 Menu Transition in the Programming Mode

■ Limiting menus to be displayed

The menu-driven system has a limiter function (specified by function code E52) that limits menus to be displayed for the purpose of simple operation. The factory default (E52 = 0) is to display only three menus--Menu #0 "Quick Setup," Menu #1 "Data Setting" and Menu #7 "Data Copying," allowing no switching to any other menu.

Table 3.9 Keypad Display Mode Selection – Function Code E52

Data for E52	Mode	Menus selectable
0	Function code data editing mode (factory default)	Menu #0 "Quick Setup" Menu #1 "Data Setting" Menu #7 "Data Copying"
1	Function code data check mode	Menu #2 "Data Checking" Menu #7 "Data Copying"
2	Full-menu mode	Menu #0 through #7

Tip Pressing the ⏶ / ⏷ key will cycle through the menu. With the FUNC DATA key, you can select the desired menu item. Once the entire menu has been cycled through, the display will return to the first menu item.

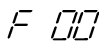
3.4.1 Setting up basic function codes quickly – Menu #0 "Quick Setup"

Menu #0 "Quick Setup" in Programming mode allows you to quickly display and set up a basic set of function codes specified in Chapter 5, Section 5.1, "Function Code Tables."

To use Menu #0 "Quick Setup," you need to set function code E52 to "0: Function code data editing mode" or "2: Full-menu mode."

The predefined set of function codes that are subject to quick setup are held in the inverter.

Listed below are the function codes (including those not subject to quick setup) available on the FRENIC-Eco. A function code is displayed on the LED monitor on the keypad in the following format:



ID number in each function code group

Function code group

Table 3.10 Function Codes Available on FRENIC-Eco

Function Code Group	Function Codes	Function	Description
F codes	F00 to F44	Fundamental functions	Functions concerning basic motor running
E codes	E01 to E99	Extension terminal functions	Functions concerning the assignment of control circuit terminals Functions concerning the display of the LED monitor
C codes	C01 to C53	Control functions of frequency	Functions associated with frequency settings
P codes	P01 to P99	Motor parameters	Functions for setting up characteristics parameters (such as capacity) of the motor
H codes	H03 to H98	High performance functions	Highly added-value functions Functions for sophisticated control
J codes	J01 to J22	Application functions	Functions for applications such as PID Control
y codes	y01 to y99	Link functions	Functions for controlling communication
o codes	o27 to o59	Optional functions	Functions for options (Note)

(Note) The o codes are displayed only when the corresponding option is mounted.
For details of the o codes, refer to the Instruction Manual for the corresponding option.

For the list of function codes subject to quick setup and their descriptions, refer to Chapter 5, Section 5.1 "Function Code Tables."

■ Function codes requiring simultaneous keying

To modify the data for function code F00 (Data protection), H03 (Data initialization), or H97 (Clear alarm data), simultaneous keying is needed, involving the STOP + ∧ keys or STOP + ∨ keys.

■ Changing, validating, and saving function code data when the inverter is running

Some function code data can be changed while the inverter is running, whereas others cannot. Further, depending on the function code, modifications may or may not validate immediately. For details, refer to the "Change when running" column in Chapter 5, Section 5.1 " Function Code Tables."

For details of function codes, refer to Chapter 5, Section 5.1 " Function Code Tables."

Figure 3.4 shows the menu transition in Menu #1 "Quick Setup."

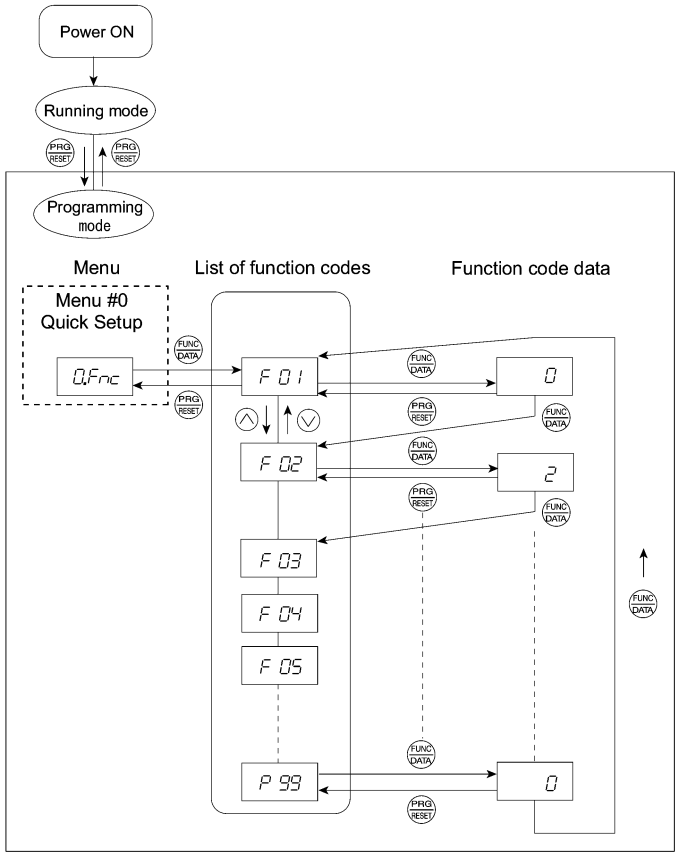


Figure 3.4 Menu Transition in Menu #0 "Quick Setup"

Tip Through a multi-function keypad, you can add or delete function codes that are subject to Quick Setup. For details, refer to the "Multi-function Keypad Instruction Manual" (INR-SI47-0890-E).

Once you have added or deleted function codes for Quick Setup through a multi-function keypad, they will remain valid even after you switch to a standard keypad. To restore the function code settings subject to Quick Setup to their factory defaults, initialize the whole data using function code H03 (data = 1).

Basic key operation

This section gives a description of the basic key operation, following the example of the function code data changing procedure shown in Figure 3.5.

This example shows you how to change function code F01 data from the factory default "0: Enable ∧ / ∨ keys on keypad" to "2: Enable current input to terminal [C1] (4 to 20 mA DC)."

(1) Turn the inverter on. It automatically enters Running mode. In that mode, press the PRG/RESET key to switch to Programming mode. The function selection menu appears. (In this example, 0.Fnc is displayed.)

(2) If anything other than 0.Fnc is displayed, use the ∧ and ∨ keys to display 0.Fnc.

(3) Press the FUNC/DATA key to proceed to a list of function codes.

(4) Use the ∧ and ∨ keys to display the desired function code (F 0 1 in this example), then press the FUNC/DATA key. The data of this function code appears. (In this example, data 0 of F 0 1 appears.)

(5) Change the function code data using the ∧ and ∨ keys. (In this example, press the ∧ key two times to change data 0 to 2.)

(6) Press the FUNC/DATA key to establish the function code data.
The SAVE appears and the data will be saved in the memory inside the inverter. The display will return to the function code list, then move to the next function code. (In this example, F 02.)

Pressing the PRG/RESET key instead of the FUNC/DATA key cancels the change made to the data. The data reverts to the previous value, the display returns to the function code list, and the original function code reappears.

(7) Press the PRG/RESET key to return to the menu from the function code list.

Tip **Cursor movement**
You can move the cursor when changing function code data by holding down the PRG/RESET key for 1 second or longer in the same way as with the frequency settings. This action is called "Cursor movement."

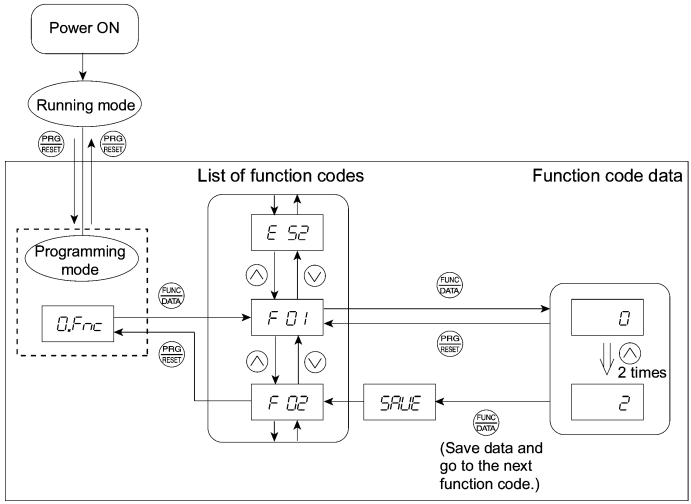


Figure 3.5 Example of Function Code Data Changing Procedure

3.4.2 Setting up function codes – Menu #1 "Data Setting"

Menu #1 "Data Setting" in Programming mode allows you to set up function codes for making the inverter functions match your needs.
To set function codes in this menu, it is necessary to set function code E52 to "0: Function code data editing mode" or "2: Full-menu mode."

Figure 3.6 shows the menu transition in Menu #1 "Data Setting."

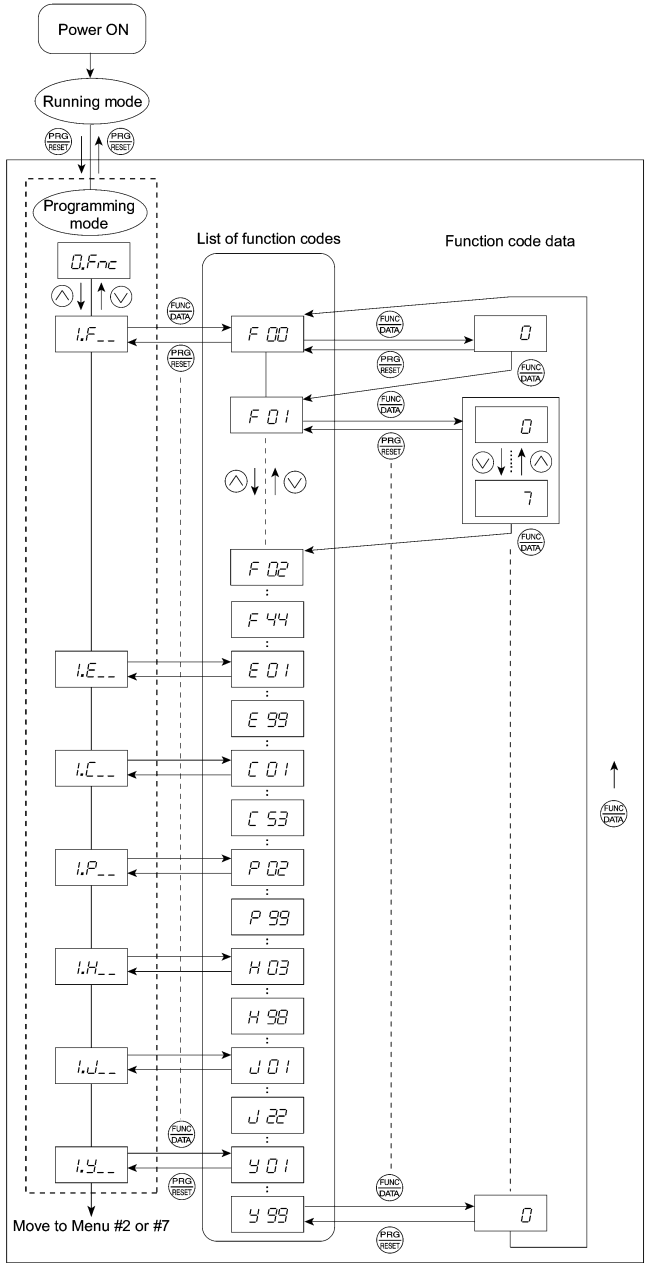


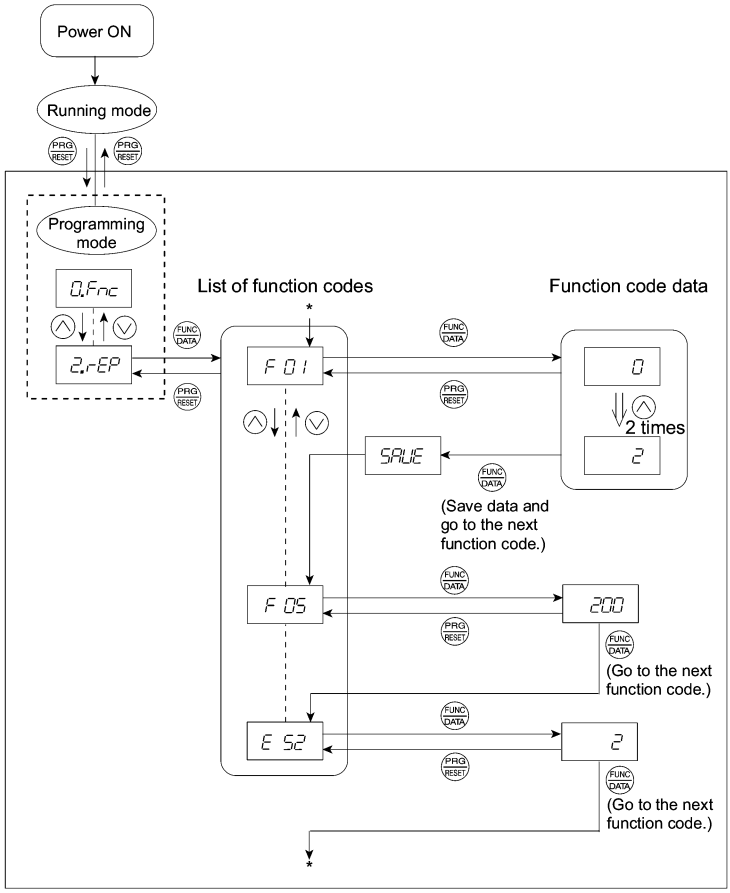
Figure 3.6 Menu Transition in Menu #1 "Data Setting"

Basic key operation

For details of the basic key operation, refer to Menu #0 "Quick Setup" in Section 3.4.1.

3.4.3 Checking changed function codes – Menu #2 "Data Checking"

Menu #2 "Data Checking" in Programming mode allows you to check function codes that have been changed. Only the function codes whose data has been changed from the factory defaults are displayed on the LED monitor. You can refer to the function code data and change it again if necessary. Figure 3.7 shows the menu transition in Menu #2 "Data Checking."



* Pressing the FUNC DATA key when the E 52 data is displayed returns to F 01.

Figure 3.7 Menu Transition in Menu #2 "Data Checking" (Changing F01, F05 and E52 data only)

Basic key operation

For details of the basic key operation, refer to Menu #1 "Quick Setup" in Section 3.4.1.

Tip To check function codes in Menu #2 "Data Checking," it is necessary to set function code E52 to "1: Function code data check mode" or "2: Full-menu mode."

For details, refer to "■ Limiting menus to be displayed" on page 3-11.

3.4.4 Monitoring the running status – Menu #3 "Drive Monitoring"

Menu #3 "Drive Monitoring" is used to monitor the running status during maintenance and trial running. The display items for "Drive Monitoring" are listed in Table 3.11. Figure 3.8 shows the menu transition in Menu #3 "Drive Monitoring."

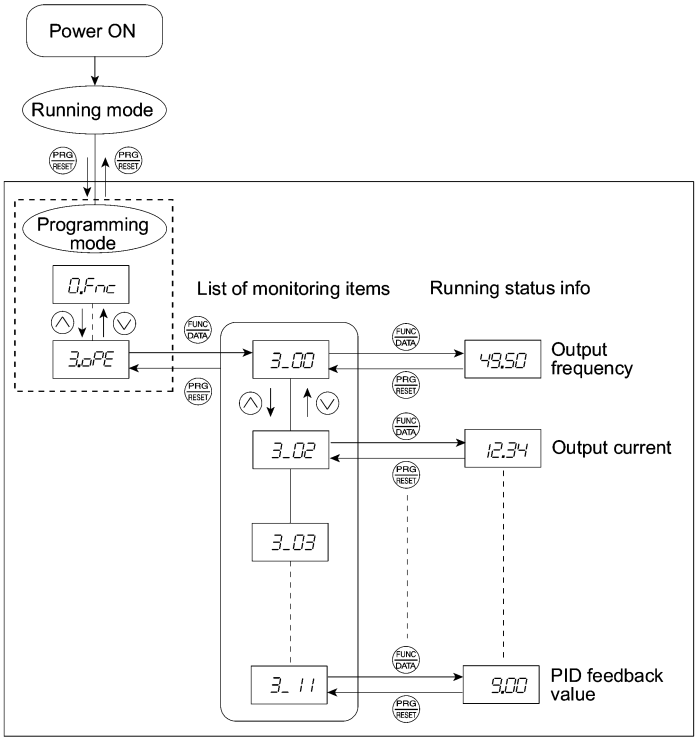


Figure 3.8 Menu Transition in Menu #3 "Drive Monitoring"

Basic key operation

To monitor the running status on the drive monitor, set function code E52 to "2: Full-menu mode" beforehand.

(1) Turn the inverter on. It automatically enters Running mode. In that mode, press the PRG RESET key to switch to Programming mode. The function selection menu appears.
(2) Use the ∧ and ∨ keys to display "Drive Monitoring" (3.oPE).
(3) Press the FUNC DATA key to proceed to a list of monitoring items (e.g. 3_00).
(4) Use the ∧ and ∨ keys to display the desired monitoring item, then press the FUNC DATA key.
The running status information for the selected item appears.
(5) Press the PRG RESET key to return to a list of monitoring items. Press the PRG RESET key again to return to the menu.

Table 3.11 Drive Monitor Display Items

LED monitor shows:	Item	Unit	Description
3_00	Output frequency	Hz	Output frequency
3_02	Output current	A	Output current
3_03	Output voltage	V	Output voltage
3_04	Calculated Torque	%	Calculated output torque of the loaded motor in %
3_05	Reference frequency	Hz	Frequency specified by a frequency command
3_06	Rotational direction	N/A	Rotational direction being outputted F: forward; r: reverse, - - - -: stop
3_07	Running status	N/A	Running status in hexadecimal format Refer to "■ **Displaying running status**" on the next page.
3_08	Motor speed	r/min	Display value = (Output frequency Hz) × $\frac{120}{(\text{Function code P01})}$
3_09	Load shaft speed	r/min	Display value = (Output frequency Hz) × (Function code E50) The 7-segment letters C J appear for 10000 (r/min) or more. If C J appear, decrease function code E52 data so that the LED monitor displays 9999 or below, referring to the above equation.
3_10	PID process command	N/A	Virtual physical value (e.g., temperature or pressure) of the object to be controlled, which is converted from the PID process command using function code E40 and E41 data (PID display coefficients A and B) Display value = (PID process command) × (Coefficient A - B) + B If PID control is disabled, "- - - -" appears.
3_11	PID feedback value	N/A	Virtual physical value (e.g., temperature or pressure) of the object to be controlled, which is converted from the PID process command using function code E40 and E41 data (PID display coefficients A and B) Display value = (PID feedback value) × (Coefficient A - B) + B If PID control is disabled, "- - - -" appears.

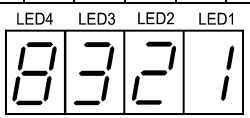
■ Displaying running status

To display the running status in hexadecimal format, each state has been assigned to bits 0 to 15 as listed in Table 3.12. Table 3.13 shows the relationship between each of the status assignments and the LED monitor display. Table 3.14 gives the conversion table from 4-bit binary to hexadecimal.

Table 3.12 Running Status Bit Assignment

Bit	Notation	Content	Bit	Notation	Content
15	BUSY	1 when function code data is being written.	7	VL	1 under voltage limiting control.
14	WR	Always 0.	6	TL	Always 0.
13		Always 0.	5	NUV	1 when the DC link bus voltage is higher than the undervoltage level.
12	RL	1 when communication is enabled (when ready for run and frequency commands via communications link).	4	BRK	1 during braking
11	ALM	1 when an alarm has occurred.	3	INT	1 when the inverter output is shut down.
10	DEC	1 during deceleration.	2	EXT	1 during DC braking.
9	ACC	1 during acceleration.	1	REV	1 during running in the reverse direction.
8	IL	1 under current limiting control.	0	FWD	1 during running in the forward direction.

Table 3.13 Running Status Display

LED No.		LED4				LED3				LED2				LED1			
Bit		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Notation		BUSY	WR		RL	ALM	DEC	ACC	IL	VL	TL	NUV	BRK	INT	EXT	REV	FWD
Example	Binary	1	0	0	0	0	0	1	1	0	0	1	0	0	0	0	1
	Hexadecimal on the LED monitor																

■ Hexadecimal expression

A 4-bit binary number can be expressed in hexadecimal format (1 hexadecimal digit). Table 3.14 shows the correspondence between the two notations. The hexadecimals are shown as they appear on the LED monitor.

Table 3.14 Binary and Hexadecimal Conversion

Binary				Hexadecimal	Binary				Hexadecimal
0	0	0	0	0	1	0	0	0	8
0	0	0	1	1	1	0	0	1	9
0	0	1	0	2	1	0	1	0	A
0	0	1	1	3	1	0	1	1	b
0	1	0	0	4	1	1	0	0	C
0	1	0	1	5	1	1	0	1	d
0	1	1	0	6	1	1	1	0	E
0	1	1	1	7	1	1	1	1	F

3.4.5 Checking I/O signal status – Menu #4 "I/O Checking"

Using Menu #4 "I/O Checking" displays the I/O status of external signals including digital and analog I/O signals without using a measuring instrument. Table 3.15 lists check items available. The menu transition in Menu #4 "I/O Checking" is shown in Figure 3.9.

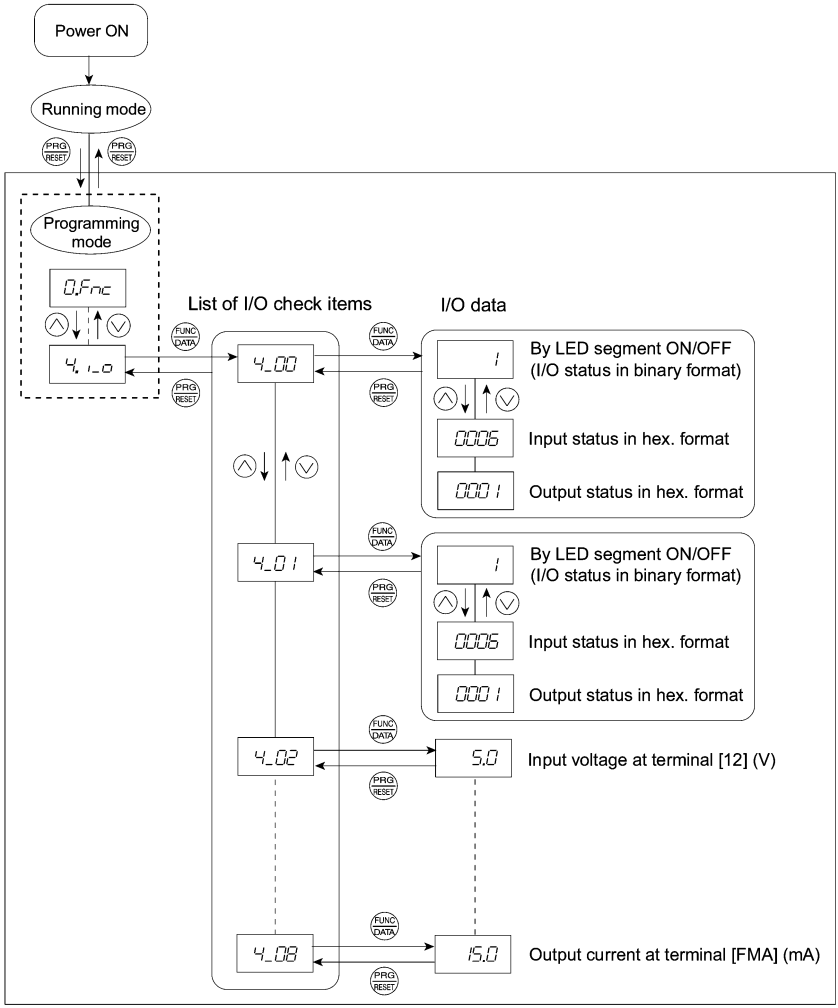


Figure 3.9 Menu Transition in Menu #4 "I/O Checking"

Basic key operation

To check the status of the I/O signals, set function code E52 to "2: Full-menu mode" beforehand.

(1) Turn the inverter on. It automatically enters Running mode. In that mode, press the PRG/RESET key to switch to Programming mode. The function selection menu appears.

(2) Use the ▲ and ▼ keys to display "I/O Checking" (4: I/O).

(3) Press the FUNC/DATA key to proceed to a list of I/O check items (e.g. 4_00).

(4) Use the ▲ and ▼ keys to display the desired I/O check item, then press the FUNC/DATA key.

The corresponding I/O check data appears. For the item 4_00 or 4_01, using the ▲ and ▼ keys switches the display method between the segment display (for external signal information in Table 3.16) and hexadecimal display (for I/O signal status in Table 3.17).

(5) Press the PRG/RESET key to return to a list of I/O check items. Press the PRG/RESET key again to return to the menu.

Table 3.15 I/O Check Items

LED monitor shows:	Item	Description
4_00	I/O signals on the control circuit terminals	Shows the ON/OFF state of the digital I/O terminals. Refer to "■ **Displaying control I/O signal terminals**" on the next page for details.
4_01	I/O signals on the control circuit terminals under communication control	Shows the ON/OFF state for the digital I/O terminals that received a command via RS485 and optional communications. Refer to "■ **Displaying control I/O signal terminals**" and "■ **Displaying control I/O signal terminals under communications control**" on the following pages for details.
4_02	Input voltage on terminal [12]	Shows the input voltage on terminal [12] in volts (V).
4_03	Input current on terminal [C1]	Shows the input current on terminal [C1] in milliamperes (mA).
4_04	Output voltage to analog meters [FMA]	Shows the output voltage on terminal [FMA] in volts (V).
4_05 *	Output voltage to digital meters [FMP]	Shows the output voltage on terminal [FMP] in volts (V).
4_06 *	Pulse rate of [FMP]	Shows the output pulse rate on terminal [FMP] in p/s (pulses per second).
4_07	Input voltage on terminal [V2]	Shows the input voltage on terminal [V2] in volts (V).
4_08	Output current to analog meters [FMA]	Shows the output current on terminal [FMA] in mA.
4_09 *	Output current to analog meters [FMI]	Shows the output current on terminal [FMI] in mA.

* The inverter has either [FMP] or [FMI] depending on the type of the control printed circuit board (control PCB).
The control PCB with a screw terminal base has [FMP] and it does not display 4_09; the one with a Europe type terminal block has [FMI] and it does not display 4_05 or 4_06.

■ Displaying control I/O signal terminals

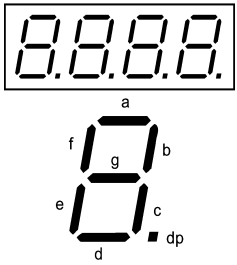
The status of control I/O signal terminal may be displayed with ON/OFF of the LED segment or in hexadecimal display.

● Display I/O signal status with ON/OFF of each LED segment

As shown in Table 3.16 and the figure below, each of segments "a" to "g" on LED1 lights when the corresponding digital input terminal circuit ([FWD], [REV], [X1], [X2], [X3], [X4] or [X5]) is closed; it goes off when it is open (*1). Segment "a to c" and "e" on LED3 lights when the circuit between output terminal [Y1], [Y2], or [Y3] and terminal [CMY], or [Y5A] and [Y5C] is closed, and does not light when the circuit is open. Segment "a" and “e to g” on LED4 is for terminals [30A/B/C], and terminals [Y1A], [Y2A] and [Y3A] on the relay output option card. Segment "a" or “e to g” on LED4 lights when the circuit between terminals [30C] and [30A] or the relay terminal circuit of [Y1A], [Y2A] or [Y3A] is short-circuited (ON) respectively and does not light when it is open.

Tip If all terminal input signals are OFF (open), segments "g" on all of LED1 to LED4 will blink ("– – – –").

Table 3.16 Segment Display for External Signal Information



Segment	LED4	LED3	LED2	LED1
a	30A/B/C	Y1-CMY	—	FWD (*1)
b	—	Y2-CMY	—	REV (*1)
c	—	Y3-CMY	—	X1 (*1)
d	—	—	—	X2 (*1)
e	Y1A	Y5A-Y5C	—	X3 (*1)
f	Y2A	—	(XF) (*2)	X4 (*1)
g	Y3A	—	(XR) (*2)	X5 (*1)
dp	—	—	(RST) (*2)	—

—: No corresponding control circuit terminal exists.

(*1) For the open/close states of [FWD], [REV], [X1] through [X5] circuits, refer to the setting of the SINK/SOURCE slide switch in Chapter 2, Table 2.11 "Symbols, Names and Functions of the Control Circuit Terminals."

(*2) (XF), (XR), and (RST) are assigned for communication. Refer to "■ Displaying control I/O signal terminals under communications control" on the next page.

● Displaying I/O signal status in hexadecimal format

Each I/O terminal is assigned to bit 15 through bit 0 as shown in Table 3.17. An unassigned bit is interpreted as "0." Allocated bit data is displayed on the LED monitor in 4 hexadecimal digits (0 to F each).

With the FRENIC-Eco, digital input terminals [FWD] and [REV] are assigned to bit 0 and bit 1, respectively. Terminals [X1] through [X5] are assigned to bits 2 through 6. The bit is set to "1" when the corresponding input terminal is short-circuited (ON)*, and is set to "0" when it is open (OFF). For example, when [FWD] and [X1] are on (short-circuited) and all the others are off (open), 0005 is displayed on LED4 to LED1.

* For the open/close states of [FWD], [REV], [X1] through [X5] circuits, refer to the setting of the SINK/SOURCE slide switch in Chapter 2, Table 2.11 "Symbols, Names and Functions of the Control Circuit Terminals."

Digital output terminal [Y1] to [Y3] are assigned to bits 0 to 2. Each bit is set to "1" when the terminal is short-circuited with [CMY], and "0" when it is open. The status of the relay contact output [Y5A/C] is assigned to bit 4 and it is set to "1" when the circuit between [Y5A] and [Y5C] is closed.

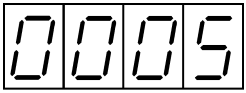
The status of the relay contact output terminal [30A/B/C] is assigned to bit 8. It is set to "1" when the circuit between output terminals [30A] and [30C] is closed, and "0" when the circuit between [30B] and [30C] is closed.

The status of the relay contact output terminals [Y1A] to [Y3A] is assigned to bits 12 to 14. Each bit is set to "1" when the terminal circuits of [Y1A] to [Y1C] are closed, and "0" when they are open.

For example, if [Y1] is on, the circuit between [Y5A] and [Y5C] is open, the circuit between [30A] and [30C] is closed, and all [Y1A] to [Y3A] are open, then "0 10 1" is displayed on the LED4 to LED1.

Table 3.17 presents an example of bit assignment and corresponding hexadecimal display on the 7-segment LED.

Table 3.17 Segment Display for I/O Signal Status in Hexadecimal Format

LED No.		LED4				LED3				LED2				LED1			
Bit		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Input terminal		(RST)*	(XR)*	(XF)*	-	-	-	-	-	-	X5	X4	X3	X2	X1	REV	FWD
Output terminal		-	Y3A	Y2A	Y1A	-	-	-	30 A/B/C	-	-	-	Y5A/C	-	Y3	Y2	Y1
Example	Binary	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
	Hexa-decimal on the LED monitor	 LED4 LED3 LED2 LED1															

– No corresponding control terminal exists.

* (XF), (XR), and (RST) are assigned for communication. Refer to "**■ Displaying control I/O signal terminals under communications control**" below.

■ Displaying control I/O signal terminals under communications control

Under communications control, input commands (function code S06) sent via RS485 or other optional communications can be displayed in two ways: "with ON/OFF of each LED segment" and "in hexadecimal format." The content to be displayed is basically the same as that for the control I/O signal terminal status display; however, (XF), (XR), and (RST) are added as inputs. Note that under communications control, the I/O display is in normal logic (using the original signals not inverted).

Refer to the RS485 Communication User's Manual (MEH448a) for details on input commands sent through RS485 communications and the instruction manual of communication-related options as well.

3.4.6 Reading maintenance information – Menu #5 "Maintenance Information"

Menu #5 "Maintenance Information" contains information necessary for performing maintenance on the inverter. Table 3.18 lists the maintenance information display items and Figure 3.10 shows the menu transition in Menu #5 "Maintenance information."

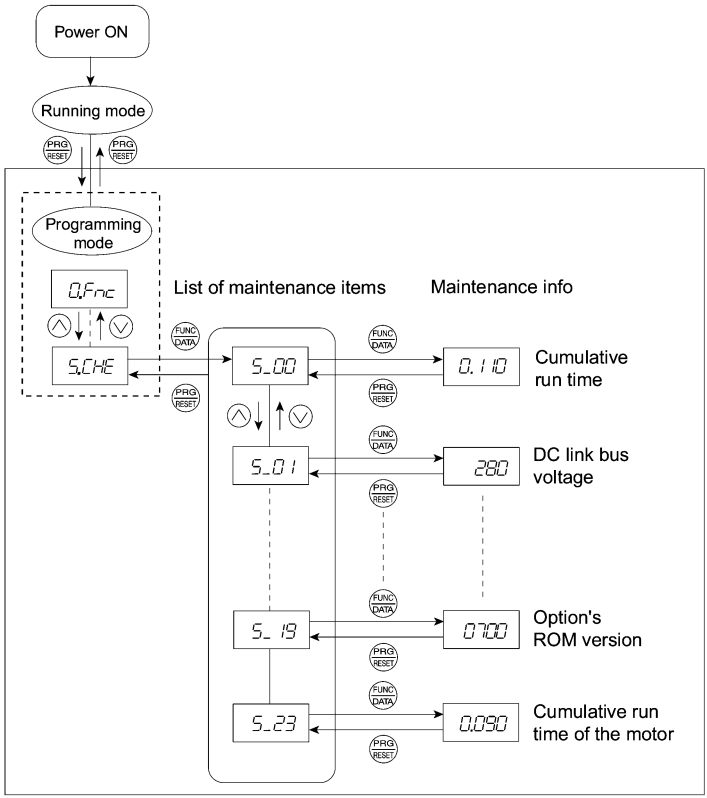


Figure 3.10 Menu Transition in Menu #5 "Maintenance Information"

Basic key operation

To view the maintenance information, set function code E52 to "2: Full-menu mode" beforehand.

(1) Turn the inverter on. It automatically enters Running mode. In that mode, press the PRG RESET key to switch to Programming mode. The function selection menu appears.

(2) Use the ∧ and ∨ keys to display "Maintenance Information" (5.CHE).

(3) Press the FUNC DATA key to proceed to a list of maintenance item codes (e.g. 5_00).

(4) Use the ∧ and ∨ keys to display the desired maintenance item, then press the FUNC DATA key. The data of the corresponding maintenance item appears.

(5) Press the PRG RESET key to return to a list of maintenance items. Press the PRG RESET key again to return to the menu.

Table 3.18 Display Items for Maintenance Information

LED Monitor shows:	Item	Description
5_00	Cumulative run time	Shows the content of the cumulative power-ON time counter of the inverter. Unit: thousands of hours. (Display range: 0.001 to 9.999, 10.00 to 65.53) When the total ON-time is less than 10000 hours (display: 0.001 to 9.999), data is shown in units of one hour (0.001). When the total time is 10000 hours or more (display: 10.00 to 65.53), it is shown in units of 10 hours (0.01). When the total time exceeds 65535 hours, the counter will be reset to 0 and the count will start again.
5_01	DC link bus voltage	Shows the DC link bus voltage of the inverter main circuit. Unit: V (volts)
5_02	Max. temperature inside the inverter	Shows a maximum temperature inside the inverter for every hour. Unit: °C (Temperatures below 20°C are displayed as 20°C.)
5_03	Max. temperature of heat sink	Shows the maximum temperature of the heat sink for every hour. Unit: °C (Temperatures below 20°C are displayed as 20°C.)
5_04	Max. effective output current	Shows the maximum current in RMS for every hour. Unit: A (amperes)
5_05	Capacitance of the DC link bus capacitor	Shows the current capacitance of the DC link bus capacitor (reservoir capacitor) in %, based on the capacitance when shipping as 100%. Refer to Chapter 7 "MAINTENANCE AND INSPECTION" for details. Unit: %
5_06	Cumulative run time of electrolytic capacitor on the printed circuit board	Shows the content of the cumulative run time counter of the electrolytic capacitor mounted on the printed circuit board. The display method is the same as for "Cumulative run time (5_00) above. However, when the total time exceeds 65535 hours, the count stops and the display remains at 65.53.
5_07	Cumulative run time of the cooling fan	Shows the content of the cumulative run time counter of the cooling fan. This counter does not work when the cooling fan ON/OFF control (function code H06) is enabled but the fan does not run. The display method is the same as for "Cumulative run time (5_00) above. However, when the total time exceeds 65535 hours, the count stops and the display remains at 65.53.
5_08	Number of startups	Shows the content of the cumulative counter of times the inverter is started up (i.e., the number of run commands issued). 1.000 indicates 1000 times. When any number from 0.001 to 9.999 is displayed, the counter increases by 0.001 per startup, and when any number from 10.00 to 65.53 is counted, the counter increases by 0.01 every 10 startups. When the counted number exceeds 65535, the counter will be reset to 0 and the count will start again.
5_09	Input watt-hour	Shows the input watt-hour of the inverter. Unit: 100 kWh (Display range: 0.001 to 9999) Depending on the value of integrated input watt-hour, the decimal point on the LED monitor shifts to show it within the LED monitors' resolution (e.g. the resolution varies between 0.001, 0.01, 0.1 or 1). To reset the integrated input watt-hour and its data, set function code E51 to "0.000." When the input watt-hour exceeds 1000000 kWh, it returns to "0."
5_10	Input watt-hour data	Shows the value expressed by "input watt-hour (kWh) × E51 (whose data range is 0.000 to 9999)." Unit: None. (Display range: 0.001 to 9999. The data cannot exceed 9999. (It will be fixed at 9999 once the calculated value exceeds 9999.)) Depending on the value of integrated input watt-hour data, the decimal point on the LED monitor shifts to show it within the LED monitors' resolution. To reset the integrated input watt-hour data, set function code E51 to "0.000."

Table 3.18 Continued

LED Monitor shows:	Item	Description
5_11	No. of RS485 errors (standard)	Shows the total number of errors that have occurred in *standard* RS485 communication (via the RJ-45 connector as standard) since the power is turned on. Once the number of errors exceeds 9999, the count returns to 0.
5_12	Content of RS485 communications error (standard)	Shows the latest error that has occurred in *standard* RS485 communication in decimal format. For error contents, refer to the RS485 Communication User's Manual (MEH448a).
5_13	No. of option errors	Shows the total number of optional communications card errors since the power is turned on. Once the number of errors exceeds 9999, the count returns to 0.
5_14	Inverter's ROM version	Shows the inverter's ROM version as a 4-digit code.
5_16	Keypad's ROM version	Shows the keypad's ROM version as a 4-digit code.
5_17	No. of RS485 errors (option)	Shows the total number of errors that have occurred in *optional* RS485 communication since the power is turned on. Once the number of errors exceeds 9999, the count returns to 0.
5_18	Content of RS485 communications error (option)	Shows the latest error that has occurred in *optional* RS485 communication in decimal format. For error contents, refer to the RS485 Communication User's Manual (MEH448a).
5_19	Option's ROM version	Shows the option's ROM version as a 4-digit code.
5_23	Cumulative motor run time	Shows the content of the cumulative power-ON time counter of the motor. The display method is the same as for "Cumulative run time (5_00) above.

3.4.7 Reading alarm information – Menu #6 "Alarm Information"

Menu #6 "Alarm Information" shows the causes of the past 4 alarms in alarm code. Further, it is also possible to display alarm information that indicates the status of the inverter when the alarm occurred. Figure 3.11 shows the menu transition in Menu #6 "Alarm Information" and Table 3.19 lists the details of the alarm information.

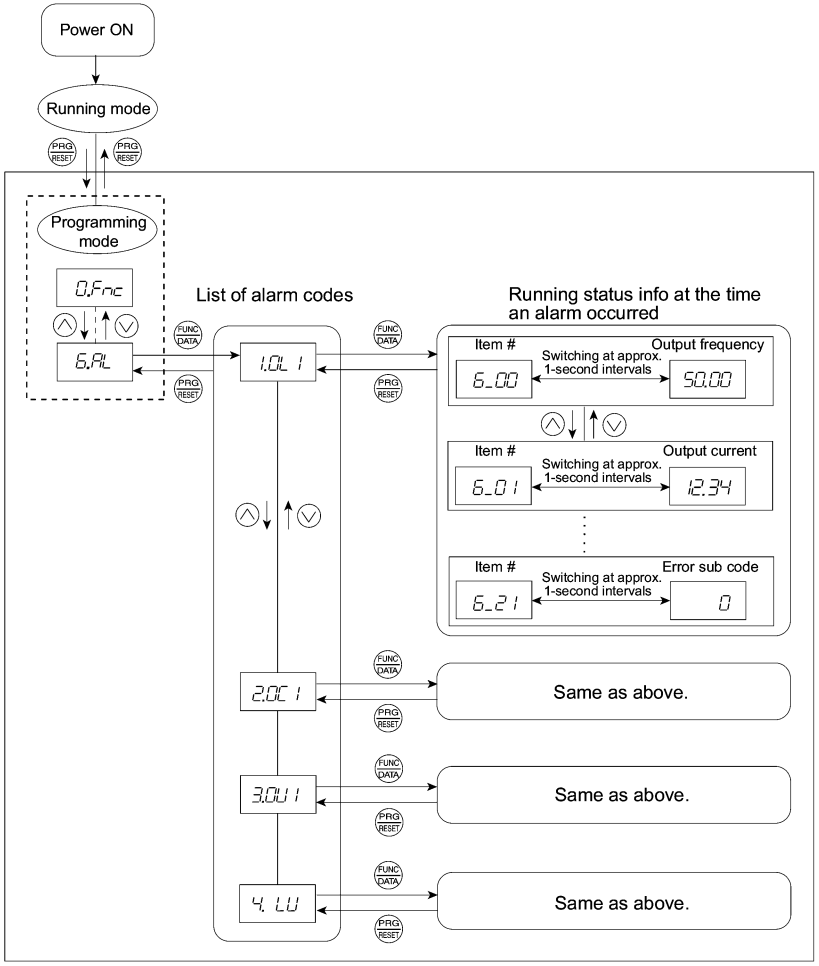


Figure 3.11 "Alarm Information" Menu Transition

Basic key operation

To view the alarm information, set function code E52 to "2: Full-menu mode" beforehand.

(1) Turn the inverter on. It automatically enters Running mode. In that mode, press the PRG/RESET key to switch to Programming mode. The function selection menu appears.

(2) Use the ∧ and ∨ keys to display "Alarm Information" (5.AL).

(3) Press the FUNC/DATA key to proceed to a list of alarm codes (e.g. 10L 1).

In the list of alarm codes, the alarm information for the last 4 alarms is saved as an alarm history.

(4) Each time the ∧ or ∨ key is pressed, the last 4 alarms are displayed in order from the most recent one as 1, 2, 3 and 4.

(5) While the alarm code is displayed, press the FUNC/DATA key to have the corresponding alarm item number (e.g. 6_00) and data (e.g. Output frequency) displayed alternately in intervals of approximately 1 second. You can also have the item number (e.g. 6_01) and data (e.g. Output current) for any other item displayed using the ∧ and ∨ keys.

(6) Press the PRG/RESET key to return to a list of alarm codes. Press the PRG/RESET key again to return to the menu.

Table 3.19 Alarm Information Displayed

LED monitor shows: (item No.)	Item displayed	Description
6_00	Output frequency	Output frequency
6_01	Output current	Output current
6_02	Output voltage	Output voltage
6_03	Calculated torque	Calculated motor output torque
6_04	Reference frequency	Frequency specified by frequency command
6_05	Rotational direction	This shows the rotational direction being output. F: forward; r: reverse; ---: stop
6_06	Running status	This shows the running status in hexadecimal. Refer to "■ **Displaying running status**" in Section 3.4.4.
6_07	Cumulative run time	Shows the content of the cumulative power-ON time counter of the inverter. Unit: thousands of hours. (Display range: 0.001 to 9.999, 10.00 to 65.53) When the total ON-time is less than 10000 hours (display: 0.001 to 9.999), data is shown in units of one hour (0.001). When the total time is 10000 hours or more (display: 10.00 to 65.53), it is shown in units of 10 hours (0.01). When the total time exceeds 65535 hours, the counter will be reset to 0 and the count will start again.
6_08	No. of startups	Shows the content of the cumulative counter of times the inverter is started up (i.e., the number of run commands issued). 1.000 indicates 1000 times. When any number from 0.001 to 9.999 is displayed, the counter increases by 0.001 per startup, and when any number from 10.00 to 65.53 is counted, the counter increases by 0.01 every 10 startups. When the counted number exceeds 65535, the counter will be reset to 0 and the count will start again.
6_09	DC link bus voltage	Shows the DC link bus voltage of the inverter main circuit. Unit: V (volts)
6_10	Temperature inside the inverter	Shows the temperature inside the inverter when an alarm occurs. Unit: °C
6_11	Max. temperature of heat sink	Shows the temperature of the heat sink. Unit: °C

Table 3.19 Continued

LED monitor shows: (item No.)	Item displayed	Description
6_12	Terminal I/O signal status (displayed with the ON/OFF of LED segments)	Shows the ON/OFF status of the digital I/O terminals. Refer to "**■ Displaying control I/O signal terminals**" in Section 3.4.5 "Checking I/O signal status " for details.
6_13	Terminal input signal status (in hexadecimal format)	
6_14	Terminal output signal status (in hexadecimal format)	
6_15	No. of consecutive occurrences	This is the number of times the same alarm occurs consecutively.
6_16	Overlapping alarm 1	Simultaneously occurring alarm codes (1) ("----" is displayed if no alarms have occurred.)
6_17	Overlapping alarm 2	Simultaneously occurring alarm codes (2) ("----" is displayed if no alarms have occurred.)
6_18	Terminal I/O signal status under communication control (displayed with the ON/OFF of LED segments)	Shows the ON/OFF status of the digital I/O terminals under RS485 communications control. Refer to "**■ Displaying control I/O signal terminals under communications control**" in Section 3.4.5 "Checking I/O signal status " for details.
6_19	Terminal input signal status under communication control (in hexadecimal format)	
6_20	Terminal output signal status under communication control (in hexadecimal format)	
6_21	Error sub code	Secondary error code for the alarm.

Note When the same alarm occurs repeatedly in succession, the alarm information for the first and last occurrences will be preserved and the information for other occurrences inbetween will be discarded. Only the number of consecutive occurrences will be updated.

3.4.8 Data copying information – Menu #7 "Data Copying"

Menu #7 "Data Copying" is used to read function code data out of an inverter for which function codes are already set up and then to write such function code data altogether into another inverter, or to verify the function code data stored in the keypad with the one registered in the inverter.

This subsection introduces restrictions and special notes concerning "Data Copying."

■ If data copying does not work

Check whether Err- or CPEr- is blinking.

(1) If Err- is blinking (a write error), any of the following problems has arisen:

- No data exists in the keypad memory. (No data read operation has been performed since shipment, or a data read operation has been aborted.)
- Data stored in the keypad memory contains any error.
- The models of copy source and destination inverters are different.
- A data write operation has been performed while the inverter is running.
- The copy destination inverter is data-protected. (function code F00=1)
- In the copy destination inverter, the "Enable write from keypad" command (WE-KP) is off.
- A Read data operation has been performed for the inverter whose data protection was enabled.

(2) If *CPEr* is blinking, any of the following problems has arisen:

- The function codes stored in the keypad and ones registered in the inverter are not compatible with each other. (Either of the two may have been revised or upgraded in a non-standard or incompatible manner. Contact your Fuji Electric representative.)

Figure 3.12 shows the menu transition in Menu #7 "Data Copying." The keypad can hold function codes for just one inverter.

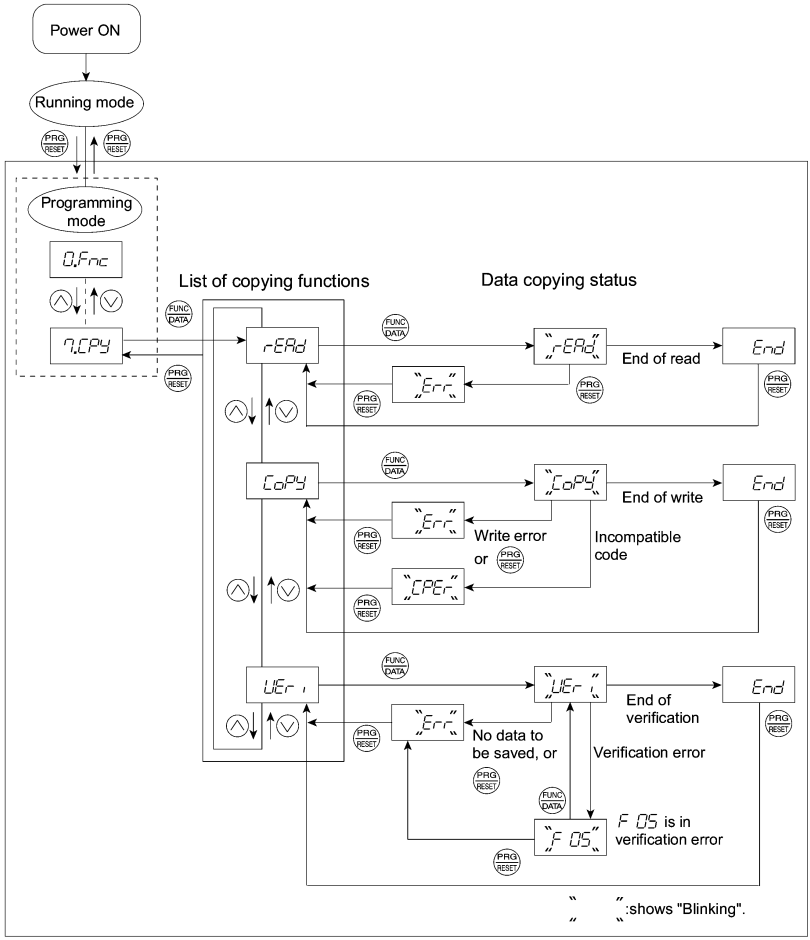


Figure 3.12 Menu Transition in Menu #7 "Data Copying"

Basic keying operation

(1) Turn the inverter on. It automatically enters Running mode. In that mode, press the PRG/RESET key to switch to Programming mode. The function selection menu appears.

(2) Use the ∧ and ∨ keys to display "Data Copying" (*7.CPY*).

(3) Press the FUNC/DATA key to proceed to a list of copying functions (e.g. *rEAd*).

(4) Use the ∧ and ∨ keys to select the desired function, then press the FUNC/DATA key to execute the selected function. (e.g. *rEAd* will blink.)

(5) When the selected function has been executed, *End* appears. Press the PRG/RESET key to return to the data copying function list. Press the PRG/RESET key again to return to the menu.

■ Data protection

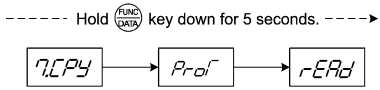
You can protect data saved in the keypad from unexpected modifications. Enabling the data protection that was disabled changes the display "rEAd" on the Data copying function list to "Prot", and disables to read data from the inverter.

To enable or disable the data protection, follow the next steps.

(1) Select the data copy "nCPy." In the Program mode menu.

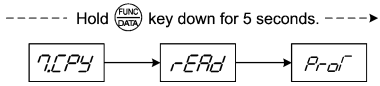
(2) Holding the FUNC/DATA key down for 5 seconds or more alternates data protection status between enabled or disabled.

• Disabling the enabled Data protection



While running the Data copying (nCPy) function, holding the FUNC/DATA key down for 5 seconds displays "rEAd" after appearing "Prot" temporarily to complete disabling the Data protection.

• Enabling the disabled Data protection



While running the Data copying (nCPy) function, holding the FUNC/DATA key down for 5 seconds displays "Prot" after appearing "rEAd" temporarily to complete disabling the Data protection.

Table 3.20 below lists details of the Data copying function.

Table 3.20 List of Data Copying Functions

Display on LED Monitor	Function	Description
rEAd	Read data	Reads the function code data out of the inverter's memory and stores it into the keypad memory. Pressing the PRG/RESET key during a read operation (rEAd blinking) immediately aborts the operation and displays Err (blinking). (*) If this happens, the entire contents of the memory of the keypad will be completely cleared.
CoPy	Write data	Writes data stored in the keypad memory into the inverter's memory. If you press the PRG/RESET key during a write operation ("CoPy " is blinking), the write operation that is under way will be aborted and "Err " will appear blinking(*). The contents (function code data,) of the inverter's memory remain partly old and partly updated. If this happens, do not operate the inverter; instead, perform initialization or rewrite the entire data. If any incompatible code is about to be written, CPEr appears blinking. If this function does not work, refer to "■ If data copying does not work" on page 3-29.
vEr ,	Verify data	Verifies (collates) the data stored in the keypad memory with that in the inverter's memory. If any mismatch is detected, the verify operation will be aborted, with the function code in disagreement displayed blinking. Pressing the FUNC/DATA key again causes the verification to continue from the next function code. Pressing the PRG/RESET key during a verify operation (vEr , blinking) immediately aborts the operation and displays Err (blinking).(*) Err appears blinking(*) also when the keypad does not contain any valid data.
Prot	Enable Data protection	Enables the Data protection of data stored in the inverter's memory. In this state, you cannot read any data stored in the inverter's memory, but write data into the memory and verify data in the memory. Upon pressing the FUNC/DATA key the inverter immediately displays "Err."

(*)To get out of the error state indicated by a blinking "Err " or "CPEr ," press the PRG/RESET key.

3.5 Alarm Mode

If an abnormal condition arises, the protective function is invoked to issue an alarm, and the inverter automatically enters Alarm mode. At the same time, an alarm code appears on the LED monitor.

■ Releasing the alarm and switching to Running mode

Remove the cause of the alarm and press the PRG/RESET key to release the alarm and return to Running mode. The alarm can be removed using the PRG/RESET key only when the alarm code is displayed.

■ Displaying the alarm history

It is possible to display the most recent 3 alarm codes in addition to the one currently displayed. Previous alarm codes can be displayed by pressing the ∧ / ∨ key while the current alarm code is displayed.

■ Displaying the status of inverter at the time of alarm

When the alarm code is displayed, you may check various running status information (output frequency and output current, etc.) by pressing the FUNC/DATA key. The item number and data for each running information will be displayed alternately.

Further, you can view various pieces of information on the running status of the inverter using the ▲ / ▼ key. The information displayed is the same as for Menu #6 "Alarm Information" in Programming mode. Refer to Table 3.19 in Section 3.4.7, "Reading alarm information."

Pressing the PRG/RESET key while the running status information is displayed returns the display to the alarm codes.

Note When the running status information is displayed after removal of the alarm cause, pressing the PRG/RESET key twice returns to the alarm code display and releases the inverter from the alarm state. This means that the motor starts running if a run command has been received by this time.

■ Switching to Programming mode

You can also switch to Programming mode by pressing STOP + PRG/RESET keys simultaneously with the alarm displayed, and modify the function code data.

Figure 3.13 summarizes the possible transitions between different menu items.

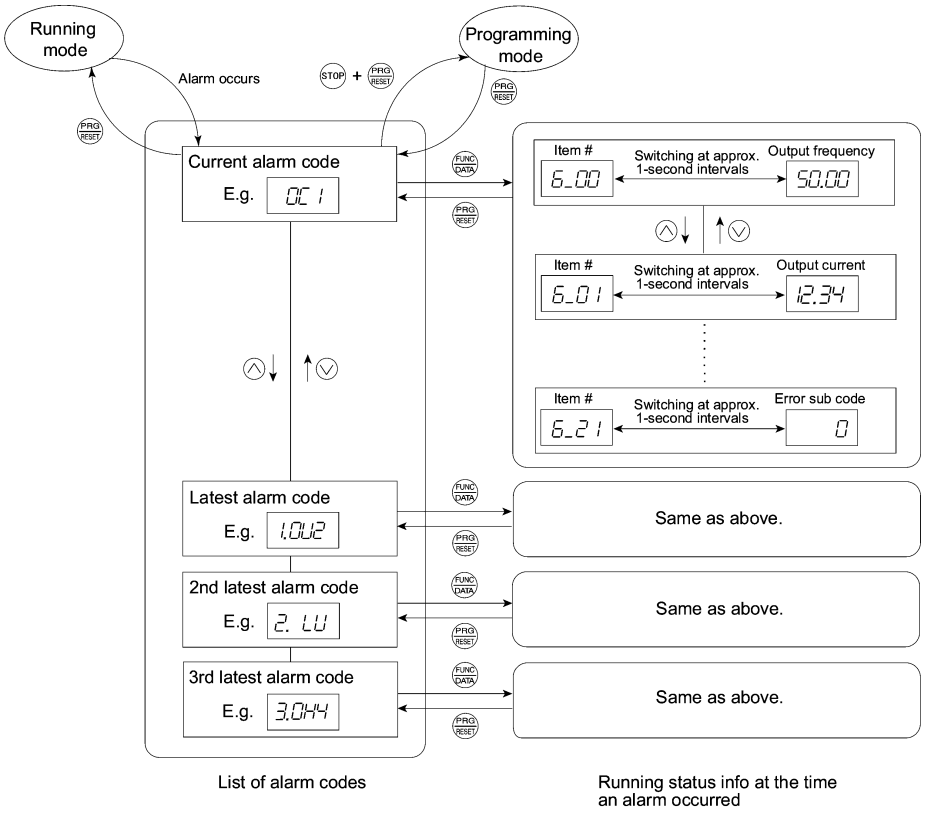


Figure 3.13 Menu Transition in Alarm Mode